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## Eco-City-Based Sustainable Settlement Planning In Bengkayang New City Area

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### Abstract:

*The inability of a city to the pressure of increasing activity in urban areas which has encouraged the expansion of development into suburban areas is a phenomenon that often occurs in major urban centers. With the development of a new area, it can be a solution to solving urban problems, expanding the availability of housing and infrastructure, and reducing disparities between the main city and suburban areas. The development of a new city, in addition to physically changing the suburban area, can also have a socio-economic impact on the people, as a challenge to fulfill the welfare of the urban housing phenomenon. Bengkayang Regency is one of the developing districts. As one of the border frontier cities in West Kalimantan Province, Indonesia, Bengkayang is the main border gate between Indonesia and neighboring Malaysia and Brunei Darussalam. The great potential of Bengkayang Regency has not been supported by adequate urban planning and arrangement, which can reflect unique regional characteristics (local wisdom). The local government has established a policy regarding the development of a new city in Bengkayang, which is located in the Bumi Sebalu Village. This study aims to carry out sustainable settlement planning in the New City Area of Bengkayang based on Eco-City. Determination of the location based on the new Bengkayang city master plan data, namely in the sub BWP housing and green open space, with a descriptive qualitative analysis method. Settlement planning carried out includes aspects of housing, area support facilities and public green open spaces. The direction for housing arrangement uses a balanced residential concept, with a cluster system without guardrails, a grid pattern following the contours and condition of the land, pedestrian-friendly, and utilizing natural potential in the form of river flows as public open space areas and jogging tracks. Commercial facilities as supporting areas are placed on main road access with more strategic functions. Public green open space as a means of socializing and recreation on a city scale, how many sub-BWP green open spaces are equipped with urban forests as bearers of ecological functions, playgrounds, water fountains, amphitheater, street vendor areas to support the local community's economy, festival market areas as well as several tourist and cultural attractions as support activity.*

**Keywords:** *New City, Settlement, Sustainable, Eco-City.*

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## INTRODUCTION

The inability of a city to withstand the pressure of increased activity in cities that has led to the expansion of development to suburban areas is a phenomenon that often occurs in major urban centers. The development of a new area is expected to be a solution to solve urban problems, expand the availability of housing and infrastructure, and reduce the disparity between the main city and the suburbs. New City Development in addition to changing the physical suburban area, can also have a socio-economic impact on the community, as well as a challenge to fulfill the welfare of the urban housing phenomenon (Sattarudin, 2019).

The new urban area itself is a rural or suburban area that is planned or developed to become an area that functions as an urban, besides that it can also be interpreted as a project whose land development has a wide scope in order to be able to provide complete and intact urban elements, in which there are residences (housing), fasosum, trade and industry.

Bengkayang Regency is one of the developing districts precisely located in West Kalimantan Province, Indonesia. Overall, it has an area of 5,396.30 km<sup>2</sup> with a population of around 289,587 people (2021) and the majority of the population is ethnic Dayak. Bengkayang is also one of the young districts because it was officially designated as a regency on April 27, 1999.

Bengkayang Regency is one of the buffer cities on the front porch of the border in West Kalimantan Province, it is a potential that Bengkayang can become an area as the main border gate between Indonesia and Malaysia (dalam Negeri, 2007). But until now, Bengkayang Regency still has not shown a specific physical identity related to the characteristics of the city itself, starting from the provision of inadequate city infrastructure and spatial patterns that have not been planned in an integrated manner. Therefore, the urban area of Bengkayang Regency has the potential to be planned in such a way that it can bring out regional identity and characteristics (Local Wisdom).

According to RDTR (Detailed Spatial Plan), the urban area of Bengkayang has several parts of urban areas that are included in the very high and high development land units as land that has suitability in the development of new areas. The development of the new area in question is how to further strengthen the function of the city and its functional and spatial linkages in order to function more optimally and be able to provide services both in the social and economic fields in the urban area and its surroundings.

The location of the Kota Baru Bengkayang area located in Bumi Sebalu Village already has a New Town masterplan planned by the local government as a central government development area, the center of higher education areas, local-scale trade and services, regional and local scale trade and services, medium-density housing, the center of sports areas, trade and environmental services and plantation areas (Heriyanti & Zikri, 2019).

One of the important components in the development of the New City Area is the Sub-Section of the Housing and Open Space Planning Area as one of the Sub-BWPs that can support the function of the New City planning (Suwarja, 2019). Adopting the Eco-City concept used in the planning of the New City, supported by the concept of Sustainability which is oriented towards a sustainable development process, it is hoped that settlement planning and open space in the New Town area can synergize and be in line with the direction of development of Bengkayang Regency.

Based on the potential and problems above, it is necessary to make efforts to plan settlements and open spaces in the Kota Baru area which is expected to be one of the prototypes that can strengthen the identity and face of the Bengkayang Regency in particular and West

Kalimantan in general. The results of this planning are expected to be a recommendation for the Bengkayang Regency government in developing or planning in other planning area subdivisions in the Bengkayang New Town area.

### Research Objectives

This study aims to compile the concept of settlement planning and green open space based on Sustainable Eco-City in the New Town area in Bengkayang Regency in accordance with the direction of spatial plans and policies of the Bengkayang Regency government, and can provide an overview of the design of the face of the city as one of the leading porches and gateways of the Indonesian state.

### METHOD

The analytical method used in this research activity is qualitative descriptive analysis, which is an analytical technique or method used in qualitative research that emphasizes more on observing phenomena and requires a sharp instinct from researchers.

### RESULTS AND DISCUSSION

#### Elements of Urban Design (*Hamid Sirvani*)

##### *Land Use*

In this area has land that is divided into 3 functions, namely, settlements marked in yellow on the map, government offices marked in purple on the map, namely the DPM Pemdes office, BPB, and the Bengkayang Regency Parekraf Office and the green area is a city park and the rest is still empty land and shrubs.

**Figure 1. Map of the Form and Mass of Existing Buildings**



*Source : Processed Author Data, 2022*

Overall, the typology of buildings in this delineation is still a form of semi-modern residential houses, it can be seen from the shape and building materials used, namely concrete, cement, and wood. The average height of the building in this delineation  $\pm$  4-8 meters or about 1

to 2 floors (Hariyanto et al., 2018) Sistem informasi geografis kesesuaian lahan perumahan di Kota Malang menggunakan metode MCE.

### ***Sirculation and Parking***

According to existing conditions, the observation area is on the primary collector road, namely Jl. Guna Baru Trans Rangkang and Jl. Sekayok as secondary collectors, precisely in Sebalu sub-district, Bengkayang district, Bengkayang district (Utomo & Mardiono, 2018). For the parking system of this area using an on street parking system, namely in the yard of each building.

**Figure 2. Road Network Conditions**



*Source : Author's Documentation, 2022*

### ***Open Space***

According to existing conditions, this planning area has a fairly dominant amount of open space compared to built-up areas, the area is in the form of empty land such as forests and shrubs, besides that there is also a rth area that has been built in the form of a city-scale park, namely Sekayok Green Park (Nasution et al., 2022). The area of the built-up area at the planned location is around 11ha, while the total area of the planning location is 342ha, so the percentage ratio between the built-up and undeveloped areas (vacant land) is about 3.22% of the land that has been built in this area, according to existing conditions. And 96.78% are undeveloped areas (Adimagistra & Pigawati, 2016).

### ***Signage***

This planning area does not have significant signage, because 90% of the land is still vacant land. However, there are several signage / building markers such as building buildings, and government buildings, besides that there are only identity markers from the green park itself.

### ***Pedestrian Ways***

According to existing conditions, the planning area does not yet have pedestrian ways.

### ***Activity Support***

Activity Support in this area is all activities and activities of government offices that dominate this area, as well as green open spaces in the form of Sekayok Green Park and several

agricultural and plantation lands are also one of the support activities in this area and several spiritual activities in this area which are also one of the supporting activities for residential areas.

### ***Preservation***

According to the existing conditions of this area there are no preservation buildings, because a building can be said to be a historical building if the building or object is 50 years old or even more. While in this area, buildings, be it office buildings or other residential buildings, are still fairly new or have not reached the age of 50 years (Kusumawati, 2019).

### ***Kevin Lynch***

#### ***Landmark***

The One-Stop Regent Office and Sekayok Green Park are the main vocal points in this region, or can be said to be landmarks of this region. Because the position and characteristics in it become the main point if you are in this planning area.

#### ***Nodes***

Nodes or meeting points in this area are at 5 intersections in this region, but the main meeting point is at the intersection of Jl. Guna Baru Trans Rangkang because the road is the main road to enter this government area.

#### ***District***

In this area there are 2 areas that are very clearly visible differences in function, namely government areas and residential areas. Where the government area is along Jalan Guna Baru Trans Rangkang, while the residential area is along Jalan Sekayok.

#### ***Path***

The main path or route in this area is on Jl. Guna Baru Trans Rangkang which on the road has 2 lanes, then there is also Jl. Sekayok as the main entrance in the planning area.

#### ***Edges***

Edges in this area are in the form of roads, namely Sekayok road and Trans Rangkang New Guna road which are barriers between densely populated or residential areas, with office or government areas.

### **Facilities and Infrastructure**

The existing planning area has several environmental facilities to support regional activities. There are several environmental facilities contained in the planning area as follows::

### ***Worship Facilities***

In the area the planner has 2 buildings as a means of worship for the surrounding community, namely a mosque and a Catholic church, which are in the middle of a residential area, to be precise on Jalan Sekayok.

### ***Education facility***

In the existing planning area there are no educational facilities.

### ***Government Facility***

There are 3 government buildings in the planning area, while the rest are outside the Bengkayang New Urban Area Delineation such as the district head's office and other government offices.

### ***Commercial Facilities***

There are 2 buildings that function as commercial buildings in the form of shophouses in the planning area.

### ***Fasum & RTH facilities***

There is one public facility in the planning area, which is a city park which is public in this area.

### ***Health facility***

For health facilities, the planning area is very close to the General Hospital of Bengkayang Regency, which is  $\pm 1.5$  km or about 5 minutes if using a motorized vehicle.

### ***Settlement Facilities***

In this area there is a residential area which is a means to support the function of the area as a residential area, which is located along the corridor of Jalan Sekayok

### ***Clean Water Network***

The main clean water network in this area comes from the local PDAM, but some residents also provide or use water storage tanks at their homes. Apart from that, there are also dug wells in several residents' homes in this area.

### ***Garbage System***

In this planning area for the waste system in this area, especially in Sebalu Village, residents still use an individual system, namely by collecting garbage and throwing it at the nearest TPS.

### ***Planning Area Non-Physical Data***

The planning area is located in Sebalu Village, Bengkayang District, Bengkayang Regency, West Kalimantan Province. The total area of Bengkayang District is 167.04 km<sup>2</sup> and is divided into 2 sub-districts and 4 villages. At the beginning of the founding of Bengkayang Regency, namely in 1999, the number of villages in Bengkayang District was 17 villages. In 2001, as many as 7 villages became Teriak District, which was the result of the division of Bengkayang District.

Looking at the area per village, the largest village area is Sebalu Village with an area of 29.65 km<sup>2</sup> or about 25.95 percent of the area of Bengkayang District and the smallest is Bumi Emas Village with an area of 4.38 km<sup>2</sup> or about 2.63 percent of the area of Bengkayang District (Kusumawati, 2022).

The planning area has an area of ± 342 ha. according to the Bengkayang Regency RDTR regional regulation, the planner's location is in the BWP E area, especially in the sub-BWP E2 section, where in the regional regulation this area will be used as a center of government, an area for developing green open spaces, sports areas, and settlements (Sudiono, 2008).

### **Socio-cultural**

Bengkayang Regency also has a variety of traditional cultures and arts and often holds cultural-based annual events such as:

#### ***Dayak Gawai Festival***

This Dayak gawai is usually held at the birthday celebration of Bengkayang Regency or at the celebration of certain holidays which are usually carried out at the betang house of Bengkayang Regency (Ramin Bantang).

#### ***Dango Ride Party***

Naik Dango is almost the same as Gawai Dayak, but it is called to celebrate the new year of rice, or it is usually held during the rice harvest season. This event is celebrated in each area in Bengkayang Regency according to their respective schedules.

#### ***Nyobeng***

Nyobeng is a ritual of respect for the results of mengayau which has been done since ancient times (Rudianto et al., 2018). Nyobeng is a ritual of cleaning human skulls resulting from headhunting of ancestors. This traditional ceremony is usually performed by the Bidayuh tribe, Sebuji Hamlet, Siding District, Bengkayang Regency.

#### ***Cap Go Meh***

Cap Go Meh is carried out by ethnic Chinese in Bengkayang Regency, usually held on 15 days after the Chinese New Year. Usually this event is held in the center of Bengkayang City.

### ***Saprahan***

Saprahan is a tradition of eating together sitting on the floor by the Malay community in Bengkayang Regency. Usually this tradition is carried out at weddings, circumcisions, or other thanksgiving events. However, this tradition is slowly being abandoned and only a few areas still hold this tradition.

### ***Tourist***

In addition to the famous Sepadang Hill tour, in Bengkayang there are also many waterfall tours, even Bengkayang Regency is also often called the land of a thousand cascades because of the many waterfall tours, such as Merap waterfall, Berawant waterfall, Parangek waterfall, Palayo cascade, Marum cascade, pangar cascade, ampang cascade, etc. Apart from cascades and mountains, Bengkayang Regency also has marine tourism that is no less enchanting, such as Randayan Island, Pulau Sobar, Lemukutan Island, and Penata Island.

### ***Geology***

In terms of soil texture, most of the Bengkayang District has medium soil texture. Furthermore, judging by the distribution of slope area, most of the Bengkayang District is included in the slope area of 15-40 percent. The most common soil types in the Bengkayang District are the Red-Yellow Podzolic (PMK) type and a small number of latosol types (Lili, 2018).

### ***Economy***

#### ***Agriculture and Plantation Sector***

The economic condition of the people in Bengkayang Regency, when viewed from sector by sector, which makes the biggest contribution to Bengkayang Regency is the agricultural sector followed by the trade sector (Utomo & Mardiono, 2018). Thus it can be concluded that the economic structure of Bengkayang Regency is still agrarian because the contribution of this sector is still arguably the largest of other economic sectors. In other words, the main support for the economy still comes from the agricultural sector. It can be seen that the area of Bengkayang Regency is mostly agricultural land or plantations, be it oil palm, rice or other things.

#### ***Water Sector***

In addition to the agricultural and plantation sectors, in the coastal areas of Bengkayang Regency, especially in Sungai Raya District and Sungai Raya Islands District, the livelihoods of the local population are more dominated by the water sector (fishermen) (Student et al., 2021). Because the area is close to the coast, the area has quite a large potential for fish resources, especially pelagic, demersal, and reef fish (Shirvani, 1985).

Other potentials are marine cultivation (captive breeding) and fish/shrimp cultivation. Fishing there can generally be done all year round, with a peak in July to September. The fishing fleet in the sea uses boats, outboard motors and motor boats.

### ***Handycrafts***

The cultural sector is also influential in the economy of Bengkayang Regency, for example in Jagoi Babang District, especially in the creative village, there are several home-based craftsmen who make and sell goods typical of Dayak Bengkayang Regency, using natural or endemic materials typical of Bengkayang Regency, namely rattan. These crafts are in the form of bidai, takin, bags, and others.

### **CONCLUSION**

The application of the balanced residential concept and the Cluster system for housing blocks consisting of private houses and official houses supported by the provision of commercial facilities, utilization of existing natural potential, used as public spaces in the form of River Walk and Cluster Environmental Parks, arrangement of green lanes along the road corridor, use of the Underground system for electricity / telecommunications / plumbing, quality improvement in the circulation system with the Boulevard concept that can give the impression of a more open and humanist outdoor space, the arrangement of open space areas in the form of green open spaces (city parks and urban forests) and non-green open spaces (playgrounds, amphitheaters, plazas, gazebos, waterfountains, and street vendor areas).

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